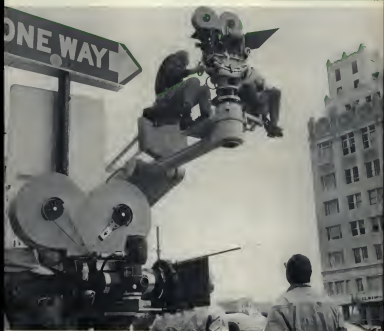


AMERICAN Cinematographer

Magazine Of Motion Picture Photography And Production Techniques



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ARRIFLEX at work — ONE OF A SERIES *



LOCKHEED CINEMATOPHANS PREPARED FOR FILMING AS STAR PORPOISE PATIENTLY

ARRIFLEX® eavesdrops on porpoise conversations for Lockheed-California

A study project on marine mammal acoustics—bearing on underwater noise and anti-submarine warfare—was completed in record time for the Lockheed-California Company with the use of Arriflex equipment. Executed under U.S. Navy contract, the experiments were conducted by Lockheed's bio-acoustics research organization, in co-operation with the curator of Marineland of the Pacific, whose porpoise training tank at Palos Verdes, California was the site of the research.

Arriflex equipment was used throughout the program, its quick setup time and long film runs were basic requirements.

Many scenes were shot at lower-level viewing ports under adverse lighting and confined conditions. When sync sound coverage of the porpoises was required, the Arriflex sync generator system performed perfectly. The project was completed in record time, and the finished picture is providing much insight into the behavior, conversational sounds and echo location capabilities of the burrows tricuspid porpoise.

Whether filming porpoises or people, missiles or microbes ... you can rely on the versatile adaptability of Arriflex! Try it on your next assignment and see for yourself!



From the microscope to the missile range... from spot locations to sound stages... Arriflex professional motion picture cameras are the dominant choice of filmmakers in science, industry, and entertainment. They're lightweight, rugged, tremendously versatile — uniquely suited to a range of applications virtually without limits. Here are some of the features that give Arriflex cameras their remarkable capabilities:

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AMERICAN

Cinematographer

INTERNATIONAL JOURNAL OF MOTION PICTURE
PHOTOGRAPHY AND PRODUCTION TECHNIQUES

DECEMBER, 1963

Vol. 42, No. 12

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ON THE COVER

SUPER PANORAMION covers, under supervision of Director of Photography David Little, ASC, shooting a location scene for Stanley Kramer's Cleopatra production, "It's A Mad, Mad, Mad, Mad World." Story about the picture's photography begins on page 704 of this issue.

ARTHUR E. GAVIN, Editor

MARION HUTCHINS, Editorial Assistant

BARBARA REYER, Circulation

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"NATIONAL carbons in the 'Titan' give cinematographers more light coverage and intensity than any other source."

Edward Colman
A.S.C.

Cinematographer Edward Colman is shown on a sound stage of the Walt Disney Studio, during the filming of tests on Disney's upcoming musical fantasy, "Mary Poppins." Colman uses a Union Carbide "Titan" arc to achieve a particular effect in the scene he is about to film.

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INDUSTRY NEWS

News briefs of industry activities, products and progress

U.S. Film Production To Top 1962 Figures

Production of feature films by American companies during 1963 reportedly will top that of '62 by 10 to 12 per cent. As of November 1st, some 155 features have been put before the cameras by U.S. producers in Hollywood and abroad. Another ten or twelve are scheduled to go into production before end of the year. Only one of these is scheduled to be shot on foreign soil.

CBS-TV to Produce Features?

When CBS network president returned to the Pacific Coast recently he indicated that his company is exploring the possibility of going into feature film production, it is reported.

ASC Admits Two

The American Society of Cinematographers, last month, voted Clarence Schwebert and Herbert E. Bang to Associate Memberships in the Society.

No Limiting of TV Commercials

Producers of TV commercials breathed easier last month following FCC's decision not act on a pending congressional bill to limit TV and radio commercials. All but one member of the FCC indicated opposition to the

bill. The Commission reportedly had received 2060 complaints a year from tele-viewers, mostly about the length and frequency of commercials on the airwaves.

Revue Seeks Added Stage Space

With its 32 stages working at capacity in TV film production, Revue Studios, last month, leased additional stage space at the Paramount Sunset lot to provide facilities for shooting three of its telepic series.

Ross N.Y. Distributor for M-R

Charles Ross, Inc., 333 West 52nd St., New York 19, N.Y., is now distributing the Mole-Richardson Company line of equipment in the New York area. Company has on hand large rental inventory of lighting and grip equipment.

CINE—Coordinator of Festival Entries

U.S. film makers wishing to enter films in the various international film festivals, should avail themselves of the service of the Committee on International Cinemathecal Events — otherwise known as CINE.

CINE is a voluntary organization established to co-ordinate the selection of U.S. non-theatrical motion pictures.

Continued on Page 444

SPECIAL, IN THE JANUARY ISSUE!

Part Two

of

TRAVELING MATTE PHOTOGRAPHY AND THE BLUE SCREEN SYSTEM

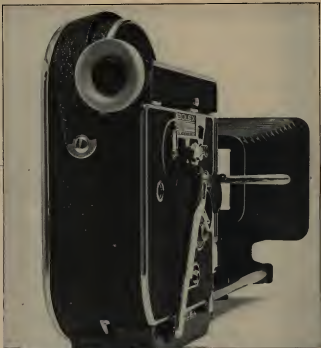
by

WALTER BEYER

Chairman, Research & Educational Committee of the ASC

First time publication anywhere of the complete technical details of this important production procedure.

Included will be specifications for the equipment and photographic procedure necessary to executing Blue Screen Traveling Matte shots on the set.



Bolex H-16 Rex-2: three-upmanship

Going one up on the Bolex H-16 Rex is almost impossible. But Paillard found three ingenious ways to refine viewing, focusing and fade control. The new reflex viewfinder gives you a life-size 1:1 image with the standard 25mm lens. The payoff is in needle-sharp focusing. The variable shutter is engraved to indicate four positions from fully open to fully closed. And when the shutter is not fully open, a new yellow safety signal pops into the reflex viewer to tell you so. Fade-ins and fade-outs are precisely controlled. The new eyepiece is adjustable from plus three to minus three diopters to suit the vision of the individual. If you're an experienced moviemaker, you probably know the standard features that have made this Bolex a global favorite. Otherwise, better get to a Bolex dealer straightaway. Why the matte box? Just a reminder that it is one of the most versatile Bolex accessories—for tilting and special effects. Can you imagine anything Bolex H-16 Rex-2 can't do? Tell us. \$500 with Lytar 25mm f/1.8 lens. Paillard Incorporated, 1990 Lower Road, Linden, N. J. In Canada: Garlick Films Ltd., Toronto. **BOLEX**

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INDUSTRY NEWS

Continued from Page 484

other than those produced by the U.S. government, for submission to foreign festivals. Before its origin, U.S. film producers submitted their films to international festivals direct. This often resulted in as many as 80 to 100 films being submitted to a single festival—far more than could be considered—or even reviewed.

To correct this situation CINE was formed. For more information, write CINE, c/o DAVLNEA, 1261 16th Street, N.W., Washington 6, D. C.

British Push Color Newsreels

Within three years Pathé, in London, has successfully developed its color newsreel from being an "experiment" to a "must" with British exhibitors and moviegoers.

In June, 1960, the newsreel, for the first time, covered, in Technicolor, a major national news event—The Derby. Previously, Pathé had speedily produced special editions of events such as the Royal Wedding, etc., all of which proved world-wide attractions. The Derby, however, was another kettle of fish. This was one of Britain's hottest of hot news events over which, of course, TV had the time advantage.

But Pathé had what was to prove an equal advantage—a quality production in color. With the cooperation of the Technicolor laboratories, delivery of the required 240 prints was made within 24 hours. It was a bold experiment that paid dividends.

Yet that was just the beginning. During 1962 some 40, out of 104 editions, were in color. Moreover, a large proportion of these color editions, averaging 700 feet in length, go to the 59 countries outside the U.K., which subscribe to Pathé newsreels.

Sport naturally lends itself to color production and, today, the majority of Britain's major sporting events are covered by Pathé. Other interests are equally covered. Undoubtedly, a new pattern of news presentation on wide screen has been established. "Since color film took its place in Pathé newsreels its importance and potential has grown to unexpected proportions. The present year should be one of many technical surprises for the exhibitor and his patrons," says G. T. Cameron, editor and general manager of Pathé News. —*Motion Picture Herald*

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pile-up in your camera gate?

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noise when shooting subjects who should not be distracted from what they are doing?

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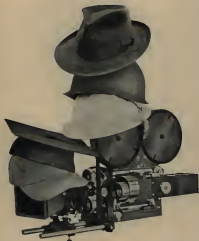
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LETTERS

Continued from Preceding Page

presently serving as a conservation project of paper weight in some offices or garage work, they might make it possible for us to complete a piece of historical equipment to full operating condition. These should be directed to the writer, c/o Hollywood film area, 8833 Sunset Blvd., Hollywood 68, Calif.

Kenn Meyer

Los Angeles, Calif.

Sirs:

I should like to take this opportunity of saying how interested students at this school are in your magazine, especially in the reports of new equipment and techniques.

P.H. MOVEMAN
The London School
of Film Technique

London, England.



RENOWN diving cameraman, André Sauter

167 DIVER MOVIE MAKER

Sirs:

I was very interested in your article, in the *Olivier* issue, on day diving. May I remind that the first man to film (on 16mm) in our sky diving movies was André Sauter (pictured above) from France, and that we produced his film, "Men In The Sky," in 1958.

Jean Jacques LAMBERTIN
CAMIER

Paris, France

GOOD SOUND BUILDS

Sirs:

In your July Q&A column, you stated that Kodachrome II was unsuitable as a single-system sound film. Following a series of tests, using an Auroson-Fix 500, variable area track, the test results are quite good. (Acoustic, piano and voice sound was recorded—all satisfactorily. Film was Type A, and recording gauge was set at 16 1/2 on the Auroson scale. The film was processed by Canadian Kodak, in Toronto.

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4. A manufacturer would view proof of the art and direction of his gun ball. How can he get it?
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WHAT'S NEW

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Portable Processor

Gordon Enterprises, Inc., 5340 N. Hollywood Blvd., N. Hollywood, Calif., announces it is distributing the Mauser-Mator portable film processor, with models available for 16mm and 35mm film, or 16mm and 10mm film. The processor employs a washcoat solution for developing and fixing and it will handle most commercially available negative and positive films. Other features include constant re-rotation and filtration, fully temperature controlled. Speed of negative processing is 15 feet per minute.



Tripped Quick-Release

Tri-Lock Corp., Whittier, Calif., announces a heavy-duty quick-release enabling quick mounting and dismounting of camera from tripod. The chrome-plated die-cast device is in two parts: one attached to tripod, the other to camera and are joined securely together on contact. A quick release lever permits quick removal of camera from tripod. Fits all still and cine cameras. List price is \$9.95 at photo dealers. Brochure is available.

New Zoom Lens

A new viewfinder model of the famous Angenieux 10 X 12, 12-120mm, F/2.2 zoom lens is announced by Zoomar International, Inc. of Glen Cove, New York. New lens enables the operator to focus and view directly through lens at all times and can be adapted to most 16mm standard "C" mount cameras. A four-to-one ratio crank for slow, smooth zooming is provided along with a zoom handle for fast zooming operations. Viewfinder can be rotated through 180° to allow camera door to be opened for threading.

Lens is 8 1/2" long in folded position, weighs approximately 2 1/2 pounds. List price is \$600.00 to \$895.00, depending on type of camera.



Broom and 35mm Synchronizers

Precision Laboratories, 928 East 51st St., Brooklyn, N.Y., announces addition of two new film synchronizers to company's line of film editing equipment. The Model 5616 is a single-gang "Unitized" Broom Synchronizer. Complete with footage counter, it is priced at \$120.00. Also available for this unit is a 16mm sprocket assembly and gearbox having a differential ratio of 2-4:1.

Model 8605-240 is for 35mm film.

Continued on Page 476



"The latitude of SUPERIOR* 2 encouraged me to extend light ratios in 'America, America'..."

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WHAT'S NEW?

Continued From Page 494

and includes an optical sound reader head and footage counter. Price of unit is \$221.90. Available also for this unit are amplifier and speakers.



Motor Adapter Door

The CSC adapter door permits the use of all Mitchell and Mitchell type variable speed AC/DC motors with the new Mitchell Mask II camera. Precision engineered and manufactured, it can be installed in seconds without tools. Four knurled thumb screws mount the door to the camera. The standard Mitchell motors can then be mounted to the adapter door in the conventional manner. Made of aluminum with a black chrome finish that matches finish of the Mitchell Reflex camera. Wiring is complete and compatible with standard camera wiring. Only 18½" x 5½" x 2½" in size, door weighs less than 2 pounds. Manufacturer is Camera Service Center, Inc., 93 West 52nd St., New York 19, N.Y.



TV Camera Tester

Designed to quickly test TV camera and tube parameters, the Spectra TV Optoliner, Model 1000, threads into the lens mount of any Vidicon camera and enables the operator to check it for opto-mechanical alignment, sensitivity, and full utilization of the scanning area, eliminating the many variables of an external test pattern. A standard test pattern—SMPT-E, EIA and

RETMA patterns are available—locks into an Optoliner keyed slot. Accuracy of the mechanical alignment from the internal test pattern to the center of the lens mount is 0.002 inch.

Even illumination without hot spots is provided for an exclusive Optoliner light integrating sphere. Regulated power supply and individually calibrated external meter makes the internal light levels and color temperature adjustable and reproducible. Accompanying test tools permit efficient quick checks of tube centering and tilting.

Model 2000 for Image Orthicon cameras incorporates a movable slide test pattern to accommodate the wider tolerance of I/O installations. Price of either model is \$1,215.25. Photo Research Corp., 837 No. Cahuenga Blvd., Hollywood 38, Calif.



Quartz Light Catalog

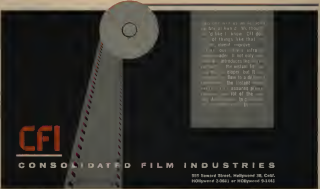
A catalog containing a complete list of all Quartz iodine lights for motion picture, TV and still photography has just been issued by ColorTran Industries, Burbank, California. Catalog describes and describes what is probably the most complete line of quartz-iodine lights for commercial lighting purposes and which may be operated from 120 volts, AC or DC without need for voltage "boosting."

Included in catalog are specifications for ColorTran's Focusing Quartz Light, Quartz-King 500 (for flat coverage) and Quartz-King Dual Light (for wide or medium flood in a single housing), as well as accessories. Information is also included on ColorTran's MiniDyne and ColorDyne electronic lighting control systems. The latter features 1k and 2K dimmers that can be converted with individual and multiple remote control units and a remote mastering control. There is also a complete listing of ultralong life quartz-iodine 650 and 1000 watt lamps manufactured under the ColorTran label and available for use with ColorTran lights. Catalog may be obtained free on request from author and ColorTran photographic supply dealers, or from ColorTran Industries, 630 South Flower Street, Burbank, California.

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BEHIND THE CAMERAS

WHAT THE INDUSTRY'S CAMERAMEN WERE SHOOTING LAST MONTH

BY PARRISH HARRISON

NOTE: Asterisks following titles indicate television film productions.

ABC—N.Y.

GEORGE STRAND—Age of Man—1969*

ALCOA ARTISTS

NEANEY COMBS, ASC, "The Naked Kim" (From Frontiers '69) with CAROLINE TONITE and Anthony Soley. Samuel Fuller, producer-director.

BLITZKOPF STUDIOS, N.Y.

J. BURK CONYER, ASC, "Film"

BIOGRAPH STUDIOS—New York

JOHN S. PROBYN, "East Side, West Side"

CASCADE STUDIOS

CHUCK WHEELER, Commercials*

HENRY FREDLICK, ASC, Commercials*

HAL MOER, ASC, Commercials*

CBS—N.Y.

GEORGE JACKSON, "20th Century"

CHARLES MACK, LEO ROSS, ROBERT CLARK SMITH, "CBS Reports"

MIKE ZUCKER, ERIC NUGMAN, "Candid Camera"

GEORGE JACKSON, BERNARD DRENNER, JOE PATER, "Twentieth Century"

COLUMBIA STUDIOS

ERNEST LAMINA, ASC, "The Trifling Lady" (Pink Panther Prod., shooting in Texas) with Steve McQueen and Lee Remick. Robert Mulligan, director.

LYNN HOLLAND, ASC, "The New Interns" (Rite Circle Prod.) with Michael Callan and Dean Jones. John Rich, director.

ROBERT WELLES, "Grand"

OSWALD NORMA, "The Pumpkin Eater" (Hawthorn Prod., shooting in England) with Anne Bancroft and Peter Finch. Jack Clayton, director.

GUY ANDRISON, ASC, "Dennis Reed Show"

FRANK PINDER, "Whole Your Way Back Home" (Hawthorn Prod., shooting in Texas, color) William Jones, producer-director.

WALTER LEONARD, "Poodle 50" (Toy Showcase International Prod., shooting in England) with Carl Lumbly and Patricia Neal. Alexander Singer, director.

ROBERT WYTHE, "Grand"

JOHN BARR, "Behold a Pale Horse" (Prod. Zennaro Prod., shooting in France) with Gregory Peck and Anthony Quinn. Fred Zennaro, producer-director.

ROBERT GIFFIN, ASC, "Good Neighbor Sam" (David Swift Prod., color) with Jack Lemmon and Rocky Schander. David Swift, producer-director.

WILCO COOPER, "You Me On the Moon" (Chas. H. Schaefer Prod., Panama, Dynamon, Producer, shooting in England) with Edward Judd and Martha Hyer. Nathan Juran, director.

DEANE LIPPMAN, "Randy 66"

LEONARD ARNOLD, ASC, "Farina's Daughter"

FRED GASTLY, ASC, "Head"

DESLU—Columbus

ROBERT DEGRASSE, ASC, "Darryl Thomas Show", "Dick Van Dyke Show"

HENRY CONZAGHER, "The Joey Bishop Show", "The Edie Beal Show"

SAM RICKER, ASC, "Andy Griffith Show"

DESLU—Culver City

CHARLES SYMMES, ASC, "The Grinning Show on Earth"

GUY MAUWILLIAMS, ASC, "Glynn", "Mr. Hansen and the Little People" (color)

DESLU—Denver

FRANK CASON, "My Favorite Martian"

THE VONSTADTER, ASC, "Ben Casey"

ROBERT PALMER, ASC, "My Three Sons"

ROBERT HALLIN, ASC, "The Breaking Point"

EDWARD FITZGERALD, ASC, "Linda"

MARIE GREENMAN, "The Lucy Show"

DON HOFFER PRODS.

JACK ROBINSON, "Godd Kingdome"

FILMMATE STUDIOS—New York

MORRIS HARTMAN, ASC, "The Defenders"

GEMMA SERVICE STUDIOS

ROBERT HALL, "Potomac Junction"

ROBERT MORROW, "Adventures of Gnome & Harvey"

ANDREW DALZIEL, "Mr. Z"

HARRY WOLF, ASC, "The Beverly Hills Cop"

GOLDWYN STUDIOS

FRED MARSH, ASC, "The Fugitive"

HENNSTADT FILM STUDIO

HOWARD BLOCK, "Mark & Mervyn for Hire"

INDEPENDENT

JACK MCLOUG, PATT HANSEN, "The Naked Bird" (Columbia Prod., shooting in Canada) with Deanne Kneale and Kerry Raggs. Larry Matson, director.

WILLIAM ZACKEN, "The Tumbling Spinnaker" (Delta Prod., Producer) Rob Whiting, director.

BENNY Y. JAROSKY, Commercials* (New York)

VICTOR LERNEY, "No Man Walks Alone" (shooting in Fla.)

AL MUELL, "Passage to Home" (color)

LARRY EMMETT, "Concept"

JACK TOWNSEND, "The Train" (Widescreen, shooting in France) with Burt Lancaster and Jeanne Moreau. Arthur Penn, director.

Continued on Page 700

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BEHIND THE CAMERAS

Continued from Page 688

INDEPENDENT

Joe MacDONALD, ASC, "Revelation is a Cop-Spyer" (Stanley Kramer Prod.; UA Re lease; Panam & Eastman color) with Bud Brainer and Jerome Rake; Richard Wilson, director.

MARKELL WEILER, "The Best Man" (Miller Thomson Prod.; UA release) with Henry Fonda and Cliff Robertson; Franklin Schaff er, director.

YVES PHILLIPS, Jr., "The Fool Killer" (London Co., shooting in east coast) with Anthony Perkins and Edward Albert; Ser vando Gamules, director.

BARRY KATZMAN, ASC, "The Pawnbroker" (London Co., shooting in N.Y.) with Rod Taylor and Geraldine Fitzgerald; Sidney Lumet, director.

ALFRED FALLS, "Resoluto" (Bronze-Copper stars Prod., shooting in Madrid) with Ty Burrell and Pope Doyle; Richard C. Mayes, director.

STYAN HUNGAROW, "Mile Corn Is Red, pop and Who is M.D." (Cinecitta Hungarow, shooting in Hungary) with George Sanden and Buddy Hackett; Richard Thorpe, director.

ARTHUR IBERICO, "The Wild Affair" (Soma Arts Film; (UK) Prod.; shooting in London) with Nancy Kwan and Terry Thomas; Frank Ernst, director.

JACK HILFMAN, CLAUDE REFOR, "Cross World" (Samuel Bronson Prod.; Paramount release; Super Technicolor 70 & 70 color, shooting in Spain) with John Wayne and Claudio Cardinale; Henry Hathaway, director.

LA REIA STUDIOS

HOWARD SWANWART, ASC, "Perry Mason"

LONG ISLAND STUDIOS, N.Y.

ARTHUR ORTIZ, ASC, "The World of Henry Orlan" (Pan-Art Prod.) with Peter Sellers and Angela Lansbury; George Ray Hall, director.

M-G-M STUDIOS

HAROLD LUDWIG, ASC, "Honeyman Hunt" (Panda 5, Brown Prod.; Prisma Metro color) with Robert Cullen and Nancy Kwan; Henry Levin, director.

PAUL VORIS, ASC, "Support in Murder" (Lawrence Wergipfer Prod.; Prisma) with Jerome Vengrad and Susan Whelan; George England, director.

MYRON KAZAN, "Looking for Love" (Kazantz Prod.; Prisma, Metroland) with Conner Francis and Joe Hutton; Don Weiss, director.

DANIEL FAY, ASC, "The Unshakable Molly Brown" (Lawrence Wergipfer Prod.; Prisma and Metroland) with Debbie Reynolds and Steve Forrest; Chuck Walters, director.

GARRETT FREDERICK, "Night of the Ignorant" (Soma Arts-John Huston-Ray Stark Prod., shooting in Mexico) with Richard Burton and Ava Gardner; John Huston, director.

ROBERT BRUNNER, ASC, "He and His" (Panda 5 Brown Prod.; Prisma, Metro color) with Robert Cullen and Nancy Kwan; Henry Levin, director.

FRED CARTER, ASC, "Kissin' Cousins" (Fox Int'l Prod., Prisma, Metroland) with Elva Priddy and Pamela Austin; Gene Nelson, director.

ROY LINDENBERG, ASC, JOHN MCNOLLA, "The Lady of Justice"; M. Fichtelberg."

ALVIN TOWSE, ASC, "Comanche"

FRANK BANCHELL, "Combat"

DALE DEVERMAN, ASC, "The Eleventh Hour"

WILLIAM SWENSON, ASC, "The Richard Boone Show"

MARKER SMITH, ASC, "Dr. Kildare"

DICK KLEIN, "Mr. Monk"

FRED KOSHERMAN, "The Lieutenant"

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J. BLAIR CANTER, ASC, "Cyril" (Ipul)

PARAMOUNT STUDIOS

WILLIAM KATLEY, ASC, "Supremacy to Hell" with Betty Williams and Marilyn Maxwell; William Crozier, director.

WILLIAM WHITLEY, ASC, Haskell Boggs, ASC, "Demetrius"

PARIS STUDIOS, N.Y.

ANDREW LINDO, GAYNE ROSENBERG, ASC, "The Nurses"

PRODUCTION CENTER, N.Y.

GEORGE STOUTER, ASC, "The Fairy Duke Show"

REPUBLIC STUDIOS

GEORGE DUBOIST, ASC, CHARLES BERKE, ASC, "Barle's Law"

FRANK PHILLIPS, ASC, "Gunslinger"

STUDIO CITY

CHARLES HALL, "The Outlaw Lawyer"

JACK STRAIN, "Reveille"

NEAL ROSENBERG, "The Great Adventure"

TWENTIETH CENTURY-FOX

LELAND CRILEY, "The Vow" (Columbia; shooting in Rome) with Eyal Bergman and Anthony Quinn; Bernhard Wicki, director.

LEON SHANSHAW, ASC, "What a Way to Go" (Appaloosa, CScope; Deluxe, Color) with Shirley MacLaine and Paul Newman; J. Lee Thompson, director.

JAMES VAN TRIER, ASC, "The Phil Soren show"

UNITED ARTISTS-IV

BILLY MARGOLAN, ASC, "Low Budget"

UNIVERSAL CITY

JOSEPH BERON, ASC, "Reverend Pecos" (Gordon Kay & Associates Prod.; Eastman color) with Audie Murphy and Doreen McCann; R. C. Springer, director.

JOHN RUSSELL, ASC, ELLIS TRACKER, ASC, WALTER SWENSON, ASC, "Amen and Amen"

JOHN WARREN, ASC, WILLIAM MARGOLAN, ASC, ELLIS TRACKER, ASC, WILLIAM RABINOWITZ, "Alfred Hitchcock Presents"

WALTER SWENSON, ASC, JOHN RUSSELL, ASC, RAY RICHMOND, ASC, "Wagon Train"

LEON LUDWIG, ASC, RICHARD BARNARD, "Kiss Theorem"

BENJAMIN KLEIN, ASC, LEON LUDWIG, ASC, RAY FINE, "The Virginians"

ROBERT TOLIN, ASC, WILLIAM MARGOLAN, ASC, "McHale's Navy"

Continued on Page 732

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DIRECTOR OF PHOTOGRAPHY Ernest Laszlo, ASC, mounted bank of cameras on elevated crane, looks down on Producer-Director Stanley Kramer as he settles action.



"MAD WORLD" camera crew prepares to film chase scene on busy Santa Monica Coast Highway in which Spencer Tracy attempts to elude pursuers.



Ernest Laszlo, ASC
Directed the Photography

Photographing

"IT'S A MAD, MAD, MAD, MAD WORLD"

TWO GULF-MOUNTED Panaflex cameras record speeding car emerging from tunnel and entering one of numerous hairpin curves at Hollywood's top studios.



WITH THE CAMERA boom extended beyond a desert cliff, Laszlo photographs well-controlled car hurtling off highway and into canyon below.





UNITED LASELO runs up battery of Panaflex films camera to film some hardy actors staged on large setpiece set in National Radio building



TO SHOOT straight down on mob action in a village square, Lasele mounted two Panaflex 65 camera on metal platform suspended from Chinaman camera crane

IN THE MILD DAWN of a mid-April morning, four pieces of motorized studio equipment bearing several Ultra Panaflex cameras and related equipment, along with a cadre of 160 crew members, stuntmen, and a corps of special effects technicians sanked out of the main gate of Buvar Studios and headed toward the desert town of Palm Springs, 120 miles southeast of Hollywood.

Six hours later, with producer-director Stanley Kramer setting the pace, Director of Photography Ernest Laszlo, ASC, started the cameras rolling on a highway location where almost daily for the next four weeks, he photographed a mighty speeding cavalcade of automobiles, trucks and airplanes, operated by skilled stuntmen and remote electronic controls for some of the most thrilling scenes for "It's a

Mad, Mad, Mad, Mad World."

The story for this collecting movie covered a lot of real estate and required that Laszlo and his camera crew and equipment traverse virtually the breadth and length of the state of California, from the Colorado desert area northward to Ventura and beyond. The company's cavalcade of personnel, equipment and personalities shot their

Continued on Page 724

CINEMATOGRAPHER LASZLO used two remote-controlled cameras to photograph this sky shot of fight plane crashing through a signboard



LASELO'S CAMERA crew fired up crane-mounted camera during a rehearsal for one of the picture's most breath and thrilling sequences involving Old Carter and John Adams





SAUL BASS designed the mood and overall look for *Mad World*.



BILL MELENDEZ of Playhouse Pictures, Hollywood, developed the animation style, based on Saul Bass storyboard.

ALLEN CHEDS, animation technician for Playhouse Pictures photographed the final artwork resulting from Saul Bass' design and Bill Melendez's animation plotting.



Designing And Producing The Credit Titles For "It's A Mad, Mad, Mad, Mad World"

THE critique was in. The rough draft of the pencil drawing test for the animated title of "It's A Mad, Mad, Mad, Mad World" had passed the first hurdle.

Said Bass, the creator and designer of the main titles of the picture, was pleased with the progress of this "problem child." So were Bill Melendez, of Playhouse Pictures, the producer of the first Cinema wide-screen title in color and animation, and Ernest Gold, the musical director, who would write the musical accompaniment.

"We're in good shape," said Melendez, after conferring with designer

Bass. "Now it's just a matter of hard work."

Designing this wide-screen animated color title was a problem solved by Bass. Producing the title was now the problem of Playhouse Pictures. From the drawing board to the final snap by film editor Hugh Kelley there would be plenty of hard work to do.

Working with a broader field of vision makes wide film production obviously more critical. Generally, it takes 10 to 12 weeks to produce an animated motion picture title because of the countless number of drawings required of the animators.

For "It's A Mad, Mad, Mad, Mad World" it meant approximately 5,000 separate drawings had to be created before Playhouse Pictures was ready for the final filming. Each drawing had to be hand-transferred by the ink-and-paint department to elongated wide-screen cells.

Thus, in working with this first in wide-screen animation, an extra 30 days was necessary for production experimentation and solving the many complex problems that arose.

After viewing the first rough pencil test, Bass outlined the changes brought about because of the change of pro-

spectre. Detailed portions of the character action had to be adjusted. New animation was added where necessary and several scenes shortened to maintain overall proportion and timing.

Bass' story concept was an excellent animated prologue that mixes extremely well with the subsequent hilarious and zany live-action of Stanley Kramer's Ultra Panavision production for United Artists.

According to Bass, the film title is a series of wild happenings in which a symbol of the world is the central character. This world-symbol interacts with the credits, and in turn becomes a globe, an egg, a spinning top, a yo-yo, ping-pong ball, etc.

"Actually, it is my hope that the audience will be continually surprised and amused by the series of comical happenings involving the globe," said Bass. "I have tried to get across a feeling that would create a sense of madness."

The film credits are tastefully designed by Bass, but integrated and timed with the action.

The 315-foot title sequence runs approximately three and one-half minutes. The first problem was the curtain-raising interval required for the Cinema screen—a screen that is 90 feet long and 35 feet high and for which it takes 22 seconds to open or raise the proscenium curtain before it. A normal screen opening usually takes four seconds. Thus, the timing of the title itself was most important in order to coincide with the curtain opening. In order to utilize the full impact of the curtain opening, the first credit—"Stanley Kramer Presents—A Cinema Production"—was especially designed to bridge and utilize this time gap.

The extreme simplicity and sharpness of Bass' story concept minimized the color problem. Only black and white textures were utilized in the drawings. Then, using solid color backgrounds and 65mm Eastman Color Negative Film, Type 5851, color was introduced in the animated title.

The new Eastman negative, which has been on the market since September, 1963, is especially adaptable to large screens, where persistence has always been a problem. The much finer grain structure is not the only improve-

Continued on Page 734



FRAME SLOWUPS of five of the title cards in the animated movie and credit title sequence which gets *Mad World* off to a hilarious start



AN AIR-TO-AIR shot by Tom Tully, ASC, in which gentleness of the camera plane played an important part in achieving the best pictorial result. Below: a lookback camera shot from tail position of a Paul Martin camera plane.



SHOOTING FROM THE AIR

When shooting with an airborne camera, among the problems encountered are maintaining steady camera contact with target or subject, minimizing camera movement or vibration, and overcoming effects of aerial haze.

By WARREN GARIN

SHOOTING WITH a motion picture camera from a plane, helicopter, or perhaps as a skydiver cinematographer, involves a number of problems for the novice not always encountered when shooting on terra firma. And if you are a professional cameraman, you are likely to be handed an aerial shooting assignment sometime during your career—maybe several—and since most aerial scenes are generally of a nature not easily repeated, it is well to be better armed with the knowledge necessary to making such assignments a success.

Aerial photography is commonly divided into three classifications: 1) ground-to-air, 2) air-to-air, and 3) air-to-ground. Ground-to-air photography, being similar to conventional exterior ground photography, does not involve any particular change in technique. The usual compensation in exposure must be made, of course, when shooting directly into the sky—reducing the lens opening 1 to 1½ stops.

Air-to-air photography involves shooting from the air to record a nearby plane or other object also in the air. Filming a ground area or object from a plane in flight is termed air-to-ground photography.

When photographing with the camera airborne in a plane or helicopter, the three main problems confronting the cameraman are: locating the "target" or subject, reducing camera movement or vibration to a minimum, and overcoming the pictorial effects of aerial haze.

Locating the "target" or subject is a co-responsibility of the aircraft pilot, for unless he knows where it is and what it is, he will have trouble locating it and difficulty in bringing the craft into position for the desired angle of photography. This problem can be overcome by briefing the pilot before take-off—discussing the object of the flight mission, location of the "target," direction of approach to be taken, the direction of circling the "target," and the altitudes at which photography is to take place. Such decisions are largely up to the cameraman who alone is responsible for the final photographic result.

Continued on Page 730

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16MM CAMERA FILMS

EASTMAN

PLUS-X PANCHROMATIC NEGATIVE NO. 7231

A high speed, fine-grain negative, well-suited for general exterior photography and to exterior photography under average lighting conditions.

ASA INDEX DAY 80 TUNG 80

TRI-X PANCHROMATIC NEGATIVE NO. 7223

An extremely high speed negative of medium graininess, particularly suitable for measured work and for exterior and interior photography under adverse lighting conditions. Also useful where it is desired to obtain great depth of field without an increase in illumination.

ASA INDEX DAY 320 TUNG 320

FORMULA-X PANCHROMATIC NEGATIVE NO. 7222

A high speed negative material for both interior and exterior photography with unexposed speed gradually increasing toward the edges of the frame. Economy is important and greater depth of field desired without increasing illumination.

ASA INDEX DAY 200 TUNG 200

BACKGROUND-X PANCHROMATIC NEGATIVE NO. 7230

A fine grain, medium speed negative for making prints for background projection. It is also suitable for general exterior photography.

ASA INDEX DAY 40 TUNG 40

PLUS-X REVERSAL NO. 7278

A high speed film suitable for general exterior photography and for indoor work where ample artificial light is available. Also useful for TV film production. When processed as a reversal, it yields good contrast and low graininess. (May also be used as a negative material with some service in speed.)

ASA INDEX DAY 80 TUNG 80

TRI-X REVERSAL NO. 7276

A high speed film suitable for general photography indoors with artificial light. Ideal for TV film production and for recording news and sporting events under adverse artificial lighting. Otherwise same characteristics as Plus-X Reversal.

ASA INDEX DAY 320 TUNG 320

EXTRACHROME COMMERCIAL FILM NO. 7255

A camera material designed to provide a low contrast original for making color release prints. Not intended for projection. Released for 2000 K halogen illumination.

ASA INDEX DAY 90 TUNG 25

*See Kodak Motion Picture No. 82

EXTRACHROME SR FILM NO. 7257 (Daylight Type)

A high speed reversal camera film designed for daylight use where illumination levels are very low or for high speed photography beyond capabilities of the slower color reversal films. Not recommended for use with tungsten light sources. When processed is suitable for direct projection or making color prints.

ASA INDEX DAY 160 TUNG 160

*Can be used with tungsten light but with severe loss of speed induced by filters that must be used.

EXTRACHROME SR FILM, TYPE R, NO. 7256

A high speed reversal camera film for use in adverse light conditions. When reversal-processed may be used for direct projection or for making color prints.

ASA INDEX DAY 80 TUNG 125**

**See 2000 K halogen illumination

*With 2000 K illumination

DUPONT

TYPE 131A CHROMA NEGATIVE

A high speed panchromatic negative suitable for high-contrast, ultra-rapid processing. May also be reversal processed for maximum picture speed and very rapid processing.

ASA INDEX

	Negative	Reversal
DAY	80	125
TUNG	80	125

TYPE 131A CHROMA TIME GRAIN

"SUPERIOR" 2 NEGATIVE

An all-purpose panchromatic negative for both exterior and interior photography. Combines very fine grain, medium speed and wide latitude.

ASA INDEX DAY 125 TUNG 100

TYPE 140A CHROMA HIGH CONTRAST

FINE GRAIN NEGATIVE

A high contrast, fine grain negative which produces maximum contrast when low brightness difference exists between object and background. It is particularly suited for topographic, industrial, scientific and other subjects against a gray background.

ASA INDEX DAY 250

TYPE 161A PANCHROMATIC NEGATIVE

A fine grain negative film with wide latitude for interior and exterior work. It may also be reversal processed with excellent results.

ASA INDEX

	Negative	Reversal
DAY	32	32
TUNG	32	32

TYPE 162A "SUPERIOR" 4 PANCHROMATIC

NEGATIVE

A high speed panchromatic negative with wide tonal range and great latitude, designed for use under low light levels.

ASA INDEX DAY 320 TUNG 300

TYPE 163A TIME GRAIN "SUPERIOR" 2

NEGATIVE

An all-purpose panchromatic negative for both interior and exterior motion picture photography.

ASA INDEX DAY 125 TUNG 100

TYPE 167A "SUPERIOR" 3 PANCHROMATIC

NEGATIVE

A high speed panchromatic negative with wide tonal range and great latitude for use in adverse light conditions or low key interiors.

ASA INDEX DAY 300 TUNG 200

TYPE 200A RAPID REVERSAL, PAN

A medium speed, fine grain panchromatic reversal film formulated for rapid reversal processing in the same solutions and at the same rate as Type 161A film listed. When properly processed, gives optimum picture and high-contrast results for professional television and motion picture production. May also be used as negative.

ASA INDEX

	As Reversal	As Negative
DAY	40	32
TUNG	40	32

TYPE 201A HIGH SPEED RAPID REVERSAL, PAN

A high speed, panchromatic reversal film designed to give a combination of highest picture speed and rapid processing characteristics. When properly processed gives optimum picture and high-contrast results for professional television and motion picture production. May also be used as a negative.

ASA INDEX

	As Reversal	As Negative
DAY	125	80
TUNG	125	80

Continued on Page 713

SHOOT

16mm Today is big business. The narrow gauge, "sub-standard" film that gave home movies its big start in the mid-twenties has come of age. Today, the consumption of 16mm film for professional use now exceeds that of 35mm and is growing at the rate of about 15% per year.

Where does it go? Television, as might be expected, accounts for a substantial slice of the total. Then there is the burgeoning production of 16mm industrial, training, religious, educational, and collegiate sports films. As one 16mm cameraman remarked recently, "Just the daily film requirements of all the 16mm Arriflex cameras in use in the U.S. would tax a single film supplier to capacity."

The ascendancy to prominence of 16mm has had its impact on the nation's film laboratories, too, bringing with it a host of problems that stem mainly from too little knowledge on the part of 16mm cameramen of the film stocks available to them.

With the bulk of our annual film production being shot and printed on 16mm, it is important that cameramen know 16mm's individual characteristics and be reasonably acquainted with the range of 16mm camera films presently available. (For convenient reference, these films together with pertinent data, are listed in adjoining columns on this page.)

The importance of 16mm in professional film production today was pointed up in a recent issue of *Revised*, monthly publication of General Film Laboratories, Hollywood, which emphasized that users should "Shoot 16mm as 16mm... not as a cut-down version of 35mm."

The 16mm films of 1923 and the years directly following, the *Revised* article points out, were manufactured for the amateur market. They were "amateur films." However, film technology has greatly improved the 16mm film over the past ten to twenty years.

"In addition, other factors have been instrumental in upgrading the entire 16mm area. The first 16mm equipment, for the greater part, was made

16MM FILM AS 16MM...

16mm camera film should not be considered "a cut-down version of 35mm." It has achieved full professional status and best results follow when it is shot as 16mm, with full consideration for its characteristics and its limitations.

produced for the low-priced market and could not be compared to the high priced, well-engineered cameras and other production equipment of the 35mm area. But, this has changed; 16mm cameras and equipment for professional use are now designed and built to professional standards. Also, as the 16mm film business grew, the professional laboratories began to take an interest, and not only adapted their existing facilities for 16mm but designed and built machinery and instituted procedures specifically for 16mm film handling. All of these, plus other factors, have made 16mm film a professional format, along with 35mm—but with its own characteristics.

16mm is now widely used as the camera film for the production of motion picture films in the school and church field, for business and industry, for defense plant and military record and instrumentation work, and for other areas in the broad non-theatrical film market. From the start of the television broadcast industry in this country, 16mm has been used extensively, and today most TV stations are equipped for 16mm prints, rather than 35mm. Some low-budget theatrical features have been shot in 16mm and blown up to 35mm negative for release printing. Some television shows and commercials have also been shot in 16mm, then blown up to 35mm, in order to satisfy the network requirements for 35mm prints. So, we can pretty well accept the fact that 16mm becomes a true professional medium when utilized properly.

The point we want to make in this discussion: best results are achieved in exposing 16mm film if its differences and limitations are understood, and observed in planning production. No one can shoot 16mm successfully as a smaller size 35mm film, but very good results can be achieved shooting 16mm as 16mm.

"There are available a variety of 16mm film stocks for professional camera use. In 16mm black-and-white there are both negative and reversal-positive types in a range of film speeds, and it should be remembered that graininess increases when films with the higher speeds are utilized to overcome low light levels.

"In 16mm color, a reversal-positive is widely available, with a 16mm color negative available only on special order. The reversal films are divided between daylight and tungsten balanced emulsions. Here, too, there is a range of film speeds in different stocks, but a lower range than a black-and-white.

"Now, before we go into some of the specific differences between 16mm and 35mm film stocks, let us emphasize that we're not asserting that either one is 'the best choice.' In general, if a certain camera film is available in

both 16mm and 35mm, you may logically expect a superior picture quality from the 35mm. But, the budget or production requirements may weigh heavily in favor of 16mm—lower cost and lesser footage for the same screen size, easily portable equipment, lower lab costs. With these thoughts in mind, let's go into the differences.

"First, size. The significant item is not so much the 16mm width compared to 35mm, but the size of the picture frame. The 16mm frame is approximately one-sixth the 35mm frame area. You expose for 1/6 the picture size, not 16/35ths.

"Second, speed of film movement: 35mm and 16mm are both shot at 24 frames per second for sound, but 35mm moves at 90 feet per minute through the camera or projector, compared to the 16mm speed of 36 feet per minute. This linear speed has a

Continued on Next Page



EXCELLENT PHOTOGRAPHIC results usually are achieved with 16mm film when the cinematographer is fully experienced in 16mm, knows the limits of the film he is working with, and has learned to stretch those limits under difficult circumstances. (Kodak Laboratories photo.)

GEVAERT

GEVAERT 12, TYPE 1 25 PANCHROMATIC NEGATIVE

Has extremely fine grain and a very high resolving power, making it an ideal studio film.

ASA INDEX 250-300 TUNG 84

GEVAERT 12, TYPE 1 51 PANCHROMATIC NEGATIVE

A panchromatic film of extremely high sensitivity, ideally suited to normal lighting and for all cinematography under poor lighting conditions.

ASA INDEX 500-550 TUNG 900

GEVAERT 30 REVERSAL, TYPE 2 23

A panchromatic reversal film for documentary work and all photography of normal exterior lighting levels, also for interiors where adequate lighting levels prevail. Has a very fine grain and great latitude in exposure.

ASA INDEX 240-260 TUNG 40

GEVAERT 30 REVERSAL, TYPE 2 68

An extremely high-speed panchromatic reversal film for documentary, scientific and all other photography under poor lighting conditions. Has soft gradation, fine grain and great faithful rendering of colors.

ASA INDEX 640-700* TUNG 200

*Expos. can be raised to 1000 or even 1200. ASA reversal film is developed and re-exposed separately.

ANSKO

ANSKO SUPER NYFAN NEGATIVE, TYPE 365

Ultra high speed panchromatic negative film possessing excellent definition, good gradation and fine grain for use under very low light levels or where maximum depth of field is required.

ASA INDEX 240-260 TUNG 800

ANSKOCHROME DAYLIGHT TYPE 2210

A high speed, fine grain reversal color film for production work under adverse light conditions. When reversal-processed, may be used for direct projection.

ASA INDEX 240-260 TUNG 90*

*With 200 filter.

ANSKOCHROME TUNGSTEN TYPE 2210

A high speed, fine grain reversal color film for production work under adverse light conditions for direct projection.

ASA INDEX 240-260 TUNG 90*

*With No. 85 filter. **At 2200° K.

ANSKOCHROME 5/100, TYPE 2210

A fine grain, medium high speed reversal color film for production work under adverse light conditions.

ASA INDEX 240-260 TUNG 90

ANSKOCHROME 5/200, TYPE 2210

Said to be the world's fastest color film. A fine grain high-speed color reversal film for camera use as a direct projection film, ideally suited to production work in adverse lighting conditions.

ASA INDEX 240-260 TUNG 90

ANSKOCHROME 5/100, TYPE 2240

A high speed reversal color film of fine grain, balanced for 2200° K. tungsten illumination. For use under low light levels or where maximum depth of field is desired.

ASA INDEX 240-260 TUNG 900

ANSKOCHROME PROFESSIONAL CAMERA FILM TYPE 242

A medium speed reversal color film balanced for 3200° K. tungsten illumination. It provides an original with low contrast from which color release prints can be made.

ASA INDEX 240-260 TUNG 30**

With No. 35 filter. *At 2200° K.

direct relationship to sound recording and reproduction quality.

"Third, the ASA exposure index: This presents a dramatic difference when the 35mm color negative ratings of 32 daylight or 50 tungsten are compared to the 16mm Ektachrome Commercial speeds of 16 daylight or 25 tungsten. At a lens aperture of 1/4, 400 foot candles are required for the 35mm negative film, 800 for the 16mm reversal—a need for just twice as much light. This is a pertinent comparison, since these are the two color films most widely used.

"One other factor that directly affects film quality is the background of experience and personal prejudice of the production crew, particularly the cinematographer. If all experience is in 35mm production, this—coupled with a distasteful opinion of 16mm as "epiphet"—will mean the resulting 16mm picture quality will justify only low opinion.

Operating Guides

"However, as the film business has changed, in Hollywood as elsewhere, the cinematographer has become millidexterity, shooting with equal ease in either 16mm or 35mm. And, in the course of becoming experts in 16mm cinematography, they've worked out certain operating guides:

"Utilize the best camera available, in order to minimize the problems of screen movement. Selection of professional lenses of the right focal length is essential for sharp exposures.

"Re-double normal care in maintenance and cleaning of the camera. Holes and dirt are magnified in the projection of 16mm film.

"Use the tripod and dolly the same as for 35mm. Don't let the lighter weight and greater portability of 16mm equipment trap you into an unnecessary hand holding of the camera.

"Follow the film manufacturer's recommendations for light levels, time of day, directions of light, etc., as closely as possible. Figure out an alternative shot for the one that just won't turn out right.

"Avoid the long shot—particularly the extreme area shot—because it won't be as sharp in the print as you expect. If it's needed for orientation, cut it as short as possible.

"In exposing 35mm film, there is a wider margin for error—in exposure, in going through extra film projections, in splicing, and in printing.

"In exposing 16mm film, it's not necessary to be six times as careful, because of 16mm being one-fourth the frame area of 35mm, but it's well to be at least twice as careful," the *Revised* article concludes.

In a subsequent issue of General Film Lab's informative publication, the editor dwelt at length on use of 16mm color film, stressing that one should "plan and expose the picture with the end use in mind." In 16mm color film production, it was pointed out, where the product is intended for either television or screen exhibition, the original exposure is the greatest determinant of screen quality, and an important factor in achieving quality in the 16mm original film is an understanding of 16mm's characteristics and limitations.

General places heavy emphasis on the need for pre-production consultation between the 16mm cameraman and his laboratory. "If he is thorough experienced in shooting 16mm color and anticipates meeting only the normal problems," says General, "all he need do is alert the laboratory of his shooting dates, arrange exposure tests, and make known his requirements. However, if he's moving from 35mm to 16mm or is otherwise new to 16mm production, he'll do well to discuss his project with the lab. Motion picture laboratory personnel see everybody's mistakes, and can help the consulting producer avoid unnecessary problems.

Camera Stock

"The most widely used 16mm color film is Eastman Ektachrome Commercial, type 7255. The film is ASA rated at 16 daylight and 25 tungsten, and compares with Eastman 35mm color negative ASA ratings of 32 and 50; so more light is required for 16mm Ektachrome than for 35mm color negative camera exposure.

"It's well to keep in mind that other basic characteristics of the two films are different, aside from width. First, the 16mm picture area is about one-third that of 35mm. Second, 16mm Ektachrome is a reversal positive color film, while the 35mm color film is a negative.

"There is a 16mm color negative available on special order from Eastman, but thus far it has been utilized principally in photo-recording by government and defense contractors, plus

Continued on Page 723

IN THE FOG ABOUT THE RIGHT EQUIPMENT?



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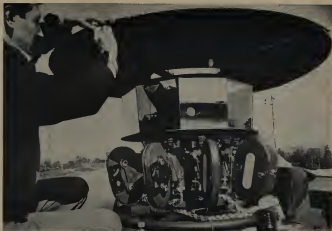


FIG. 1.—NILES TECHNICIAN Carl Pasella adjusts spatial Behrend-hell panorama camera complex for photography. Ten Arriflex 16mm cameras precisely aligned and mounted vertically in a circle photograph

segments of 360-degree scene as reflected in angular mirrors above them. Reflections seen in photo are from protective glass panels mounted before the mirrors.

PANORAMA MOVIES

New York World's Fair visitors will see spectacular movies filmed with this panorama camera complex, in which ten Arriflex 16mm cameras, mounted vertically, photograph a complete 360-degree scene reflected in mirrors.

By JOSEPH HENRY

ONE OF THE MOST unique motion pictures ever filmed, a 12-minute presentation telling the dramatic story of the New York-New Jersey Port and its 14,000,000 people, is in course of production for showing at the New York World's Fair next year. Producing the film for the Port of New York Authority is Fred A. Niles Communications Center, Inc., New York.

What makes this production unique is the multiple camera set-up being used to photograph it and the special projection techniques that will be employed to screen it as a 360-degree ultra-spectacular

in a circular theatre in the Port Authority's Heliport and Exhibit Building at the Fair. The film will feature unusual and dramatic panoramic views of the New York City area with special emphasis on the transportation facilities operated by the Port Authority.

The "cameras" used by the Niles production crew is actually ten cameras in one—a "rig" as they choose to call it, in which ten Arriflex 16mm cameras are mounted in a circle to photograph scenes in a 360-degree circular format. Following specifications laid down by Niles technicians, Behrend's,

Inc., Chicago, distributors of professional motion picture equipment, designed and built the ten-camera unit pictured here especially for this project.

The "camera"—a term we shall henceforth use to describe the ten-camera rig—weighs 650 pounds, and as this writing is receiving rugged use, since Niles' New York camera crew is shooting from helicopters, rafts on the Hudson river, and from the top of the George Washington Bridge. It also will be suspended beneath a jet airliner to shoot a sequence of dramatic and spectacular aerial views of Manhattan.

Cameras Mounted Vertically

The camera assembly is 40 inches in diameter and 40 inches in height. The ten cameras are mounted vertically to shoot up into ten circularly aligned mirrors, as shown in the photo (Fig. 1) and in the diagrams (Figs. 3 and 4). Each camera is equipped with a Taylor, Taylor & Hobson 12.5mm lens having an angle of coverage of 42 degrees. This provides an extra 6 degrees of latitude in the angle of field which will be eliminated by appropriate masking in the projection equipment.

Both the optical and control components of the camera posed a number of problems in design and construction. To achieve the necessary parallax correction, for example, mirrors were employed to "fold" the light so that the nodal points of all ten lenses would coincide at one central point (Fig. 4). This insures even lines of sight at any point from 3 feet to infinity.

Without the mirrors, the image continuity between cameras of objects moving horizontally at close range would be broken. This is illustrated graphically in Fig. 2 which shows the "dead" areas "A" that otherwise would exist between the viewing range of the lenses of the ten cameras. In a 10-camera, no-mirror arrangement shown in this illustration, a person or a vehicle traversing the viewing range of, say three cameras, would be out of view during the intervals they moved through the "A" areas. This is because the angle of acceptance of each lens forms a triangle with the apex at the nodal point of the lens. Arranging the cameras so they shoot upward into the mirror complex, as previously described, eliminates this problem.

Synco-Interlock Method

A special gear interlock mechanism joins the drive shafts of each camera so that all ten operate in unison, with the shutters opening and closing precisely in unity, and with the pull-down claw movement also in synco.

Holding tolerances was yet another problem, according to Belend's engineers. Maintaining mirror, mounting and other tolerances at the time of the



FIG. 1—Diagram illustrates one type of multiple camera arrangement for panoramic photography. It shows the lines of sight (field of view) of each camera where no mirrors are employed and cameras are continuously pointed to shoot segments of the scene directly. Dead areas "A" are not covered by the lenses. Objects passing between the cameras would not appear on screen in continuous action as they would be cut off camera range when traveling an "A" area. Now compare this with Fig. 3 below.



FIG. 2—Cameras arranged in the Belend-Hall panoramic camera complex. Each camera is mounted vertically and shoots upward into an opaque mirror which virtually "folds" the light from a central nodal point to the position of the camera lens while still maintaining an effective central nodal point. Note that the lines of sight are configurations and there are no dead areas as in A, Fig. 2. Thus no object passing laterally before the cameras would appear on the screen in continuous action.

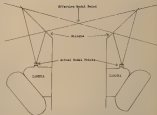


FIG. 3—Dissection diagram of the camera assembly showing how mirrors are positioned at angle above each camera lens with resulting in the actual and effective nodal points. Cameras record scene segments reflected in the mirrors for a continuous 360-degree panoramic picture.

Continued on Page 724

THE FUNCTION

By AUREEY MALPHERS

Department of Radio-TV Films,
University of Kentucky



FIG. 1—Emulsion cross sections showing the first steps in black-and-white reversal processing. FIG. 1, above, shows top layer of negative exposed (latent image).



FIG. 2—Developed silver negative image. Undeveloped layer below.



FIG. 3—Bleached—negative silver image retained.



FIG. 4—In situ exposure of the positive image.



FIG. 5—Second development of the positive image.

VARIOUS APPLICATIONS in film usage and the number and variety of machines used for reversal processing have increased to the extent that manufacturers can recommend formulas and procedures only along broad lines. When modifications in processing are required, an understanding of the function and purpose of each chemical used in the process is useful.

In processing to produce a negative in the conventional procedure, the exposed silver halide is developed to metallic silver and the remaining undeveloped silver halide grains are dissolved out of the emulsion in a fixing bath.

Conversely, with the reversal, direct-positive system the silver negative image produced in first development is dissolved out in a bleach bath, leaving a complementary positive image which is re-exposed and developed to a metallic silver positive in a second development.

High Contrast Negative

Because the black-and-white reversal process constitutes the production of both the negative and positive images within the same emulsion layer, there are important differences between this and the conventional negative-positive method which must be considered.

The first developer acts conventionally to reduce the exposed silver halide to form a silver negative image. This image is dense and contrasty compared to usual negative standards because two conditions are required: 1. In the reversal negative image the silver halide in the extreme highlight areas

OF CHEMICALS IN REVERSAL PROCESSING

A review of the chemical elements and procedures involved in reversal processing of black-and-white motion picture films.

must be largely used up so as to yield the very low densities required in the subsequent positive image. Because of this need for full development of highlights without excessive shadow density, a high contrast developer is required. 2. At the same time, the character of the first developer must be such as to produce a long scale of tones—from the highlights to the extreme shadows. To accomplish this purpose in reversal first development, two developers (reducing agents), hydroquinone and ascorbic acid, are used in combination.

Reducing Agents

All developer solutions contain chemicals known as reducing agents. When silver halides in film emulsions are exposed to light, their structure is weakened in such manner as to permit the affected halides in the emulsion to be reduced to metallic silver. Reduction is accomplished by the reducing agent in combination with oxygen, enabling the agent to react with the exposed silver halides and separate or reduce the silver.

One of the properties of a reducing agent is its reducing potential. This refers to its relative ability to develop or reduce the silver halides. A reducing agent of high potential attacks silver halides vigorously, whereas one of low potential is slower in its action.

The characteristic activity of a reducing agent is another factor to consider. Some agents are more active in the highlights areas, some in the shadow areas, and still others have overall activity.

Hydroquinone is a reducing agent of low potential. Because of its characteristic activity it is capable of producing highlights of great density while retaining transparency in unexposed areas. Therefore, hydroquinone fulfills condition No. 1 above.

In accomplishing condition No. 2, ascorbic acid is a reducer of high potential. Because of its characteristic overall activity it is capable of producing the long scale of tones including shadow detail in the image.

The relative activity of these two agents in solution will remain constant,

so the higher the contrast desired, the greater should be the ratio between the concentration of hydroquinone and ascorbic acid.

Accelerators

Developing agents are either neutral or slightly acid and, as such, usually have little reducing ability. To utilize the reducing capabilities of these agents, it is necessary that they be in an alkaline state. To make the developing solution alkaline, an accelerator is added.

The accelerator energizes the reducing agent and softens the emulsion, permitting more rapid penetration by the developing solution. A deficiency of alkali retards development whereas an excess results in an increase in activity and contrast, eventual chemical fog, and overworking of the gelatin.

Accelerators are divided into three general types: mild, moderate, and strong. Sodium hydroxide is a strong, caustic alkali used in reversal developers to promote rapid action and produce high contrast. A weak alkali does

FIRST DEVELOPER

Purpose of Ingredient	Chemical or Ingredient	Amount per Gallon	Function in Processing
Water Softener	Water	95 gal.	
Developing Agent	Ascorbic Acid	20 grains	Optimal if water is known to be soft
Developing Agent	Hydroquinone	10 grains	High potential reducing agent
Solution Preservative	Sodium Sulfite	400 cc.	Prevents excessive oxidation
Developing Agent	Hydroquinone	2 cc., 250 grains	Low potential reducing agent
Accelerator	Potassium Bicarbonate	1 cc., 10 grains	Prevents development maximum fog
Silver Halide Solvent	Potassium Thiocyanate	200 grains	Prevents low speed/high contrast
Accelerator—Sodium Sulfite	Sodium Sulfite	2 cc., 250 grains	Mildest reducing solution effecting
Add for high contrast processing only	Sodium Sulfite	5 cc., 417 grains	Prevents over-contraction of emulsion above 10° F.
	Water	to make 1 gallon	

SECOND DEVELOPER

Purpose of Ingredient	Chemical or Ingredient	Amount per Gallon	Function in Processing
Water Softener	Water	95 gal.	
Developing Agent	Ascorbic Acid	20 grains	Optimal if water is known to be soft
Solution Preservative	Sodium Sulfite	400 cc.	Prevents excessive oxidation
Developing Agent	Hydroquinone	2 cc., 250 grains	Low potential reducing agent
Accelerator	Potassium Bicarbonate	250 grains	Prevents development maximum fog
Accelerator—Sodium Sulfite	Sodium Sulfite	2 cc., 250 grains	Mildest reducing solution effecting
Accelerator—Sodium Sulfite	Sodium Sulfite	5 cc., 417 grains	Prevents over-contraction of emulsion above 10° F.
Water	Water	to make 1 gallon	
Fixing Bath	Water 1 gallon, Potassium Bichromate 1% (anhydrous), 140 fold excess		
Clearing Bath	Water 100 gallons, Sodium Sulfite (anhydrous) 2% (anhydrous), 800 water to make 1 gallon		

LIGHT YEARS AHEAD

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LIGHT

*wonders about impact of new system, says it
may reduce time it takes for them to get paid



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not give the same results as a strong one, even though allowance is made for the difference in strength; therefore, substitution should not be attempted.

Postoperative

All organic developing agents in an alkaline state have a strong affinity for oxygen. It is necessary, therefore, to add a preservative to developing solutions to prevent extensive oxidation. The preservative prolongs the usefulness of the developing solution and prevents the formation of colored oxidation products, which cause stains. Sodium sulfite is the preservative used in reversal solutions. Sodium sulfite also dissolves silver bromide to some extent and therefore is useful in reducing grain size.

The quantity of preservative used varies greatly. The following factors determine the amount required: the tendency of the developing agents to oxidize, the concentration of the developer (a dilute developer requires more preservative than a more concentrated solution); the temperature at which the developer is kept or used (The rate of oxidation increases as the temperature increases); the keeping properties required and the way in which the solution is used; and the alkalinity of the solution. (The more strongly alkaline the developer, the more rapid is the rate of oxidation.)

References

Without a restrainer most developers act too rapidly and reduce unexposed halides near the surface of the emulsion, causing chemical fog, developing streaks, and produce an image lacking in contrast. When a restrainer is added, development time is prolonged and for is automated.

Potassium bromide is the chemical used in the reversal process as a restrainer. Since film emulsions are basically composed of silver bromide, in development bromide is released from the silver into the solution. This bromide, too, acts as a restrainer but it is not sufficient in amount to prevent fog.

Excessive amounts of neutraliser will cause greatly retarded development and may result in excessive density in the highlights of the positive image. With small, correct amounts of bromide the depression of the density is not sufficient to materially alter the character of the image and produce the effect of underexposure because the neutraliser

effect is relatively greater on the development of low than on the mean.

The effect of such restraining substances is greater with some developers than others but is constant and very characteristic of individual developers, being, in general, greater with those of low energy (low potential) such as hydroquinone than with the more energetic (high potential) such as ascor-

Silver Solvent

Potassium thiocyanate is a silver halide solvent used in fine grain developers to reduce grain size by dissolving the silver grains as they are formed. It usually has the function of an accelerator as well as that of clearing the highlights. The solvent acts to reduce density preferentially in the highlights because the residual undeveloped grains in such regions of high exposure are the smallest and least reactive ones which, because of their size, are dissolved most readily.

Although the later steps in the process can influence the general density level, the attainment of a satisfactory low highlight density without other loss of quality is best obtained by the addition of the silver halide solvent to the developer rather than the alternatives of increasing first development time or modification of the other steps of the process.

Calgon is recommended as a water softener. Its use is not required where it is known that the water is already soft.

References

In the black-and-white reversal process it is required that the bleach dissolve the black metallic silver particles constituting the negative image, produced as the first developer, without affecting deleteriously the underdeveloped silver halide which remains to form the positive image.

Beaches useful in this process contain an oxidizing agent such as potassium permanganate or potassium dichromate, and an acid such as sulfuric. Their purpose is to oxidize metallic silver to silver ion, which stays in solution at least until it can dissolve out of the gelatin layer.

Permananganate blends have been used in the process but are difficult to control because of their poor keeping and exhaustion properties and because they exert a complex influence on the re-exposure sensitivity, which may affect nose reproduction.

Dichromate bleaches are used not

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only because of better performance in respect to these problems, but also because they are capable of working faster, a feature which recommends them for the reversal process.

It is necessary that the bleach solution be agitated vigorously for best results. Air bubble agitation is sufficient and substantially increases the working life of the solution.

Clearing

The purpose of the clearing bath is to completely neutralize the bleach and prevent carry over of the bleach into the second developer. Clearing consists of treatment of the bleached film in a sulfite solution which reduces the residual oxidizing compounds in the retained bleach as well as by-products of the bleaching reaction substances which leach out of the film emulsion in the clearing bath and in the succeeding rinse.

Sodium sulfite is the chemical used in the clearing solution. It is helpful in preventing stained highlights, but film should not receive treatment in this solution for more than one minute at 60° F. Excessive time in clearing will cause fading out of the silver halide and loss of density in the positive image.

Too brief a clearing treatment results in staining which will show up in the positive image.

Second Development

With the exception of thiocyanate, the same basic chemicals are used in second development as in the first. The second developer may be any vigorous developer which completes its action within the time limitations of equipment being used.

In general, a powerful silver halide solvent such as thiocyanate should not be used in the second developer because the dissolution of silver halide may be so rapid as to cause a serious loss of maximum density and the production of dichroic fog. Soft working developers should not, in general, be employed to reduce contrast especially if the undesired quality is a result of faulty processing in a preceding step.

Another chemical, potassium sodite, exerts powerful restraining action and for this reason is used only sparingly in the second developer. Used normally, it produces a condition requiring a fixation time not practical in the reversal process. However, in situations no more than 15 grains per gallon, it may be

used to convert any silver bromide dissolved by solvents in the developer to silver iodide, which is reduced to silver only with difficulty, so that the tendency to fog is decreased.

Potassium iodide has an additional purpose, where used in the second developer, of producing a blue-black tone in the positive image.

The following may be helpful in determining the cause of any departure from normal quality experienced in the process when film is known to have correct exposure:

In First Developer

Once the correct time and temperature for the first developer is determined, all other steps in the process either go to completion or reach a plateau of development where the effects of changes in treatment are negligible.

Control of the first developer is of primary importance, since over- or under-development at this stage cannot be corrected in subsequent steps of the process. If highlights and shadow densities are high, first development may be insufficient due to wrong time or temperature or exhaustion of the bath. If the highlight speed is abnormally high and the shadow density is low, excessive first development is probably the cause. If the highlights are normal and the shadow density is low, the cause may be light-fog or unusual chemical fog occurring in first development.

Silver Stain (Dichroic Fog)

Silver stain consists of finely divided silver and is formed in development only in the presence of some solvent of silver bromide, and can be caused by an excess of sulfite or alkali. The stain is produced when silver halide dissolved from the emulsion by the solvent is reduced to metallic silver by the developer, and is usually more in evidence in the shadows or clear portions of the emulsion where little bromide is liberated in development.

Silver stain appears as a yellowish or reddish green metallic sheen when the film is examined by reflected light, and has a pinkish tint when examined by transmitted light.

Streaking

Assuming other baths to be of known quality, more difficulty may be experienced in bleaching than in any other step of the process. Less tolerance to

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NEW

The projector is a converted front shutter Simplex with a two pin intermittent 16mm or 35-32 film runs at a speed of 144 ft. per minute while 35mm film runs at a speed of 165 ft. per minute.

1. A variac controls the light intensity.
2. A 500 watt lamp is used for 16mm and a 1,000 watt for 35mm (a blower is used to cool the lamphouse).
3. A 2 1/2 inch projection lens is furnished with each unit.
4. A start stop lever controls the power to the lamp and motor.
5. The magazine and take up core takes up to 3,000 ft. of film.
6. Upper guide rollers are made to handle the film from either direction of the feed reel.
7. A free wheeling take off flange is provided in the magazine.
8. A lamp near the takeup reel permits hand inspection of the film prior to takeup.

NOUVEAU

Le projecteur contient un obturateur Simplex anterior transformé avec deux clavettes intermittent. Les films de 16mm ou 35-32 tournent avec une vitesse de 144 pieds à la minute. Tandis que les films de 35mm tournent avec une vitesse de 165 pieds à la minute.

1. Le regulateur de voltage d'intensité d'éclairage.
2. La lampe de 500 watt est nécessaire pour les films de 16mm et de 1000 watt, pour les films de 35mm (un ventilateur est mis en place pour refroidir la chambre de la lampe).
3. L'objectif de 2 1/2" est installé.
4. La manivelle de mise en marche et d'arrêt contrôle en même temps la lampe et le moteur.
5. La boîte de films avec noyau peut contenir 3000 pieds du film.
6. La roue supérieure est construite de manière de recevoir le film dans les deux directions, rouleuse par la bobine centrale.
7. Une roue est installée pour libérer rapidement le film de la bande.
8. La lampe se trouve près de la bobine réceptrice, et donne toute facilité pour inspecter le film à main levée dans le projecteur.



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NUOVO

Questo proiettore è un Simplex trasformato, obturatore al fronte, meccanismo di scatto di due pule. La velocità di proiezione è in 16 o 35-32mm e di 144 piedi per minuto, e in 35mm, di 165 piedi per minuto.

1. Controllo manuale della luminosità della lampada.
2. Lampada di 500 watt per 16mm e di 1000 watt per 35mm.
3. Obiettivo di proiezione di 2 1/2".
4. Maniglia per controllo di motore e lampada di proiezione.
5. La cassetta porta pellicola può contenere 3000 piedi.
6. I rulli superiori di guida sono costruiti per operare con film proveniente da entrambi della bobina avvolgitrice.
7. Disco con montatore sgorgante nel magazzino.
8. Una lampadina illumina la bobina avvolgitrice, permettendo l'ispezione manuale del film prima che si avvolga nel proiettore.

NUEVO

Este máquina es un projector simplex convertido, obturador al frente y movimiento intermitente a doble grifa. Para 16mm o 35-32mm, la velocidad fue de proyección es de 144 pies por minuto, para 35mm es de 165 pies por minuto.

1. Un reóstato controla la intensidad de la lámpara de proyección.
2. Para 16mm se usa una lámpara de 500 watt, y una de 1000 watt para 35mm (un chorro de aire ventila las lámparas en ambas cosas).
3. Cada unidad está provista de un lente de proyección de 2 pulgadas de media.
4. Una palanca de control opera el motor y la lámpara simultáneamente.
5. Capacidad de proyección: rollos de hasta 3000.
6. Los rodillos de guía superiores operan con la película en ambas direcciones.
7. La tapa de la bobina de carga es desmontable.
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prolong concentration of bath and time of treatment may be experienced here than in any individual step of the process.

Experience has shown that the principal cause of stain or spurious high-light density is the use of excessively strong Bleaches. Generally excessive bleaching time, especially with the more concentrated baths, depresses the sensitivity to re-exposure causing a selective loss in the lower middle tone densities and excessive contrast.

Excessively dense and discolored highlights may result from inadequate clearing, but they usually indicate trouble in the Bleach caused by lack of rinsing between first developer and bleach or by using a bleach of improper composition. Bleach exhaustion can cause dense highlights, usually in a somewhat streaky pattern.

As a rule of thumb, the black silver negative image as it appears on exit from first developer rinse, should disappear—he reduced in tone—by the halfway point in the Bleach treatment.

Exposure to strong light, such as inspection of the image with auxiliary light, at this point may cause depressed film sensitivity.

The successful use of the dichromate Bleach is dependent on the control of these steps, the rates of reaction and movement by diffusion of reactants and reaction products must be harmonized. The silver is first converted to silver ion which is in solution in the presence of the sulfite and dichromate ions. If the rate of formation of silver ion exceeds its rate of removal by diffusion from the gelatin emulsion layer into the bath, solubility limits are reached and soluble are deposited which are not readily removable in the steps of the process preceding second development.

This imbalance occurs more readily in the bleaching of fine grain images because the relatively great surface of small silver grains favors rapid reaction with the bath. Use of a Bleach that is too concentrated for a particular film may cause the formation of the residues.

Since the stain material is a by-product of the silver bleaching process it is present in greatest amount in the picture highlights which are the areas of greatest negative silver image density. Undoubtedly, stains are most conspicuous in these areas in the positive image.

Clearing

Loss of maximum density, when

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baths are in good condition and when quality is otherwise normal, may be caused by attack on the silver halide in the clearing bath by excessively long treatment in a strong sulfite bath. Excessively dense and discolored highlights may result from inadequate clearing, but they usually indicate trouble in the bleach.

Second Development

Lack of development in the second developer can cause loss of contrast and maximum density. This can be checked by cutting out a piece of film after it has been re-exposed and giving it normal development in a fresh batch of the developer.

Summary

Many factors affect the processing of an emulsion—the type of solution, time, temperature, the type of emulsion, and the exposure. Other factors remaining constant, an increase in temperature increases the rate of development. This, in turn, increases contrast, fogging tendencies, and graininess. Decreasing temperature decreases the rate of development, the contrast and fogging tendency and graininess.

All these factors must be properly balanced to obtain satisfactory results.

References: G. E. Ives, J. W. Zandma, N. A. Eder and C. C. Wick, "Processing Methods for Use with Two New Black-and-White Reversal Films," *Journal of SMPTE*, Vol. 66, No. 1, pp. 4-11, January 1957.
"Motion Picture Laboratory Practices," Eastman Kodak Company, 1955.

SHOOT 16MM AS 16MM

Continued from Page 713

some experimental production. In general, it is expected to have the same advantages and disadvantages as 16mm black-and-white negative: requiring less light, and recording improved detail and contrast, but plagued by problems of dirt and abrasion and suffering loss of quality in the immediate stages required for quantity print orders. So, for all practical purposes, we are discussing Eastman Ektachrome Commercial as our 16mm color film.

Original Exposure

"Theoretically, a 16mm color film records as much information as as plotting a picture as a 35mm color

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film. However, excellent results are achieved in 16mm Ektachrome when the cinematographer is 16mm experienced, knows the limits of the film he is working with, has learned how to stretch those limits under certain circumstances, and knows what not to attempt.

"Just as in 35mm color work, the quality of the original largely determines the quality of the image to be viewed, whether it is a reflecting screen or television tube. Sharpness of image, color saturation, pleasing composition, and clean separation of colors are determinants of print quality. They are important for the screen, particularly important for television because of the limiting characteristics of the television color chain. Some of the same points made regarding exposure of 35mm color motion pictures for television also apply to 16mm.

Original Developing and Daily Printing

"Ektachrome is developed to a standard, and the variations possible in black-and-white processing are not available in color. In brief, the cinematographer shoots to a standard, and the laboratory similarly develops.

"16mm daily workprints may be made on either color reversal or black-and-white reversal stock, and they may be timed scene-by-scene or printed "one-light," using an average printer light. Most producers order color prints because they want to be able to judge the color in the workprint and they've also found that certain defects (off-exposure, flares, streaking) tend to be minimized in the black-and-white print.

16mm Color for Television

"To date, production of color film for network television has all been in 35mm, with 16mm prints the primary requirement in network negotiation. 16mm reduction color prints are included for stand-by use. However, the great majority of television stations are equipped with 16mm projectors rather than 35mm. As more stations take on the color capability, it may be reasonably expected that mass distribution of color prints will be in 16mm as it now is in black-and-white for the networks, and 100% in syndication sales.

Conclusion

"To recap, professional work and results are achieved with 16mm color

film when 16mm Ektachrome is handled as a separate and distinct type of film rather than cut-down 35mm. In all types of production, advance consultation with the laboratory on special problems and specific information tends to pay off in reduced troubles and cost. Utilization of 16mm color has expanded tremendously over the past ten years, and additional volume may be expected in the future."

16mm may be a small film, but today it's big business.

PANORAMA MOVIES

Continued from Page 715

camera's construction, was problem enough, they said, and it was compounded by the built-in flexibility called for in the original specifications.

For example, each of the Arriflex 16M cameras had to be mounted within a tolerance of .00025 inch. No amount of deviation was permissible in any of the three axes, which insured that the horizons as recorded by each of the ten cameras would be in precise alignment to produce unbroken continuity. Additionally, it was important that such tolerance be maintained for each camera and be unaffected by the frequent removal of cameras for loading and unloading of film. To achieve this, each camera and its rig mount were given corresponding numbers which insured that cameras would always be re-mounted in their original mounts.

The mounting mechanism employs a flexible, detachable, pin-indexed coupling, and any camera can be removed, unloaded and reloaded, then re-mounted on the rig in less than 45 minutes.

Alignment of the mirrors was just as critical as aligning the individual cameras, but it was achieved so that no further adjustment need be made when the 10-camera complex is being operated in the field. Optically-ground, water-clear windows are mounted in front of the mirrors to protect their first-surface coatings from dust, moisture, etc.

Main Structure

Steel was chosen over aluminum for the main structure of the 10-camera complex, because of steel's greater rigidity. Two 40 inch steel rings, top and bottom, make the rig easy to handle. Three-inch aluminum tubes can be at-

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It has a continuous movement with drive of a novel design giving instant stop and reverse without the aid of magnetic clutches, brakes and electronic relays, being exceedingly easy to maintain.

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tucked to the top ring to permit crews to carry the rig "median-chair" fashion.

Remote, simultaneous control of all ten cameras is achieved through a central control box that is connected to the rig by means of a 12-foot length of 36-conductor cable. The control box incorporates the following components:

- 1) Ammeter with selector switch that indicates the amount of current being drawn by each camera. One of the purposes of this feature is to provide advance indication of any possible motor burn-out or other malfunction, and to keep the energy balance equal.
- 2) Voltmeter that indicates condition of the 12-volt automobile battery which powers the device.

- 3) An electronic complex that automatically stops the 10-camera interlock when any one camera operates improperly.

Each of the Arriflex cameras is factory-equipped with a backstop that stops the camera in event the film breaks, backles or a lower loop is lost, etc. In such event, it would be indicated on the control box panel which camera was in trouble. Whenever all cameras are stopped through a risk function, this safety control operates so quickly that no mechanical damage



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The new Arriflex 16M camera was chosen for this multiple-camera rig be-

cause of its light weight, precise reproduction of movement, the fact it can accommodate the lens desired, and its precision-driven film take-up and general rugged design. Each camera is equipped with a 400-foot magazine.

Following completion by Behndt-engineers, the camera was put through two weeks of rigid testing by the Niles organization. Immediately afterward Niles' camera crew was busy shooting the footage in 16mm color that will wind up as a 12-minute dramatic two-episode of the New York New Jersey Port and its 14,000,000 people.

Meanwhile the Port Authority is building a circular theatre in its Helmsport and Exhibit Building on the New York World's Fair grounds in which the ultra-spectacular film will be screened, and literally surround audiences. There will be no seats in this unique theatre. The circular screen will be about 7 feet above the floor, enabling visitors to wander about the theatre as projection of the picture is in progress. The projection room will be suspended from the ceiling, in the center of the theatre, thus eliminating obstruction on the floor.

PHOTOGRAPHING "MAD, MAD, MAD, MAD WORLD"

Continued from Page 705

way through Long Beach, Oxnard, Santa Monica, Malibu, San Pedro, Palos Verdes, Thousand Oaks, Camarillo, Santa Rosa, Tustin, Santa Ana and San Diego.

In most of these cities the main streets were the location sites for filming scenes for "Mad World." In Palos Verdes, a most remarkable set was constructed—a two-acre park which looked as if it had been there forever. Before Kramer's crazy construction specialists arrived it had been a dreary, shade-covered promenade overlooking the Pacific.

When cinematographer Laszlo's cameras were artfully trained on the "set" it was a grayy dell of flowers, shrubbery and 70 towering, half-grown sage and fan palms. The company spent two weeks on this location, then returned to the studio for the final sequences in which all the stars work together—the orthopaedic ward of a police hospital.

There was one other distant location in which only Phil Silverman performed—the town of Kernville, 200 miles away and deep in a canyon of the High Sierra. Here Silverman drove his car across what he thought would

be a ford in the rushing Kern River. It wasn't. The car and the actor went straight down. It was a very funny scene. Nobody knew, until after steady freemen had pulled him to shore, that Silverman is probably the only male adult resident of Beverly Hills who can't swim.

"Kramer Park"—a bucket square block at Bourse Studios and a surrounding complex of streets and buildings—was the last two days of production. It was a meticulously planned chaos involving, each day, 2,000 extras, 200 bit players, a platoon of stuntsmen, mounting special effects machinery, fire engines, police cars, cranes, derricks, pile-drivers and torpedoes producing wind-machines which blew hundreds of thousands of pieces of bunny-money over the monumental scramble. Men fell from buildings and fire ladders onto power lines, into palm tree tops, through pedestrian bridges into big ponds, onto picnic tables and into the arms of studios.

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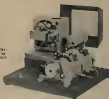
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of people—the industry's special effects experts and the stuntmen. No motion picture can purvey sensational thrills, excitement, or the breathtakingly impossible without them. And no motion picture was ever designed to make fuller use of their astonishing abilities than "It's a Mad, Mad, Mad, Mad World." The title alone would be proof.

"You explain special effects" that way," says Danny Lee who headed the company's crew of 20 practitioners of controlled magic and creators of non-injurious disasters. "Script writers have no limits on their imaginations. What we do is to make photographable anything they come up with. All it takes is mechanical ability, a knowledge of hydraulics, pneumatics, electronics, engineering, construction, ballistics, explosives and an acquaintance with the word 'impossible'."

There is no major sequence in "Mad World" in which Lee's cunning is not employed. Some things he and his men could do with their hands behind their

*Not to be confused with special photographic effects. These were produced for the picture by Ian Duns, A.S.C., and his staff at Film Effects of Hollywood. A story on this phase of "Mad World" will appear in the January issue—ED

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backs. Most had to be achieved from scratch by putting Bill Rose's impossible ideas on a drawing board and then building the gimmicks, glasses and machinery to execute them. Such as these items:

Explode 6,000 pieces of percussion and moving fireworks around Caesar and Miss Adams in the hardware store cellar; construct a working service station that would come apart, piece by piece, as actor Winters battled with actors Kaplan and Stang; devise a fire escape on the side of an 80-foot building that would gradually break away from its moorings while all the stars were clambering on it; run the automobile, personally containing Duran, one mile down a mountain highway and crash it over a 500-foot cliff; design and build a fire-engine ladder that would flip actors one-by-one from the top of its 160-foot length.

In all there were 217 such items on the film's special effects lists.

The task of Lee's trade art is a conglomeration of unworldly devices such as pamberry siphons, gun powders, squibs and squib hooks, dynamite caps, pulleys, cranes, compressors, popping matches, air rams, hydraulic rams, smoke pots, smoke blowers, cables and wires and opaque paint. The pamberry siphon he used when Kramer wanted a speeding automobile, driven by Mickey Rooney, to kick up an outrageous cloud of dust. Baskets of Fuller's earth were placed out of sight on the framework of the car and the siphon, energized by air, created a monumental sandstorm. Squibs are minute but powerful explosive charges formulated of gun powder and fulminate of mercury which are fired electrically to release a squib hook. Just right for blowing limbs off trees while actors are binging on them. A popping match is a sort of fuse which emits a spray of sparks at regular intervals as it burns. Just the thing for the slow blasting apart of an airport tower's radio penic. Opaque paint is one of the most precious of assets; people and things which the camera catches floating through the air have to be on wires and cables. The illusion would be destroyed if the apparatuses could be seen. But coated with the special paint they are invisible.

Of all the challenges to their ingenuity Lee and his crew are proudest of the Duke Goldberg they contrived to run Duran's car off the cliff. It was a radio-controlled automatic pilot put to-

gether with bits and pieces of electronic equipment they acquired from the laboratories of the California Institute of Technology and nearby aerospace plants. When the time came for shooting the sequence Lee stood on a helioid a mile away from the car, started it, steered it, slowed it for curves, then sped it at 80 miles an hour off the highway. Recording it all was cinematographer Ernest Laszlo behind the Super Panavision camera mounted on a Chapman crane extended out over a steep desert cliff.

"To photograph 'Mad World,'" said Laszlo, "required 166 shooting days, during a period of seven-and-a-half months, during which time we exposed 636,000 feet of Eastman Color negative from which the picture's final Cinema print was produced by Technicolor."

"MAD WORLD" TITLES

Continued From Page 707

ment in the 5251 color negative, however. The color balance has also been vastly improved. There is now a greater response in the red-orange-yellow range of the spectrum and less emphasis on the blue range. This improved over-

all color balance results in more realistic flesh tones and brighter greens and reds.

Wide-screen productions present many new problems dealing directly with animation. By definition, animation is illusion. An artist creates separate phases of movement which give the illusion of continuing action when projected in sequence on a screen.

In creating this illusion of life and movement, the animator normally uses a work (or drawing) sheet measuring 8½" by 12" or variations of this proportion. Thus, the characters created and the resulting situations must be held to this specified proportion.

However, working with wide-screen projection, the proportions of this work sheet obviously are increased in agreement with the end product. The work sheet in wide-screen animating is 6½" by 10½".

How does this affect the animator?

"He loses the illusion the drawings are supposed to create because of the definite changes in perspective," explains Bill McLeades. "After working with a prescribed field of proportion, you find that, when projected on a wide screen, the movement of life is

FLASHBACK TO YESTERYEAR



1914—The place: Pargson Soadra, 61, Lee, New Jersey. The picture: "Poor Little Rich Girl," starring Mary Pickford (at right, in photo). Others are, from left: Director Maurice Tourneur, cinematographer Lucien Andriot, ASC, cranking a Pathé camera and who co-photographed the picture with John Van den Brook (now deceased), shown here recording the scene with an Edair camera. (Photo courtesy Lucien Andriot, ASC.)

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drastically minimized."

It is easy to say, of course, that the designer must stay his course according to the new proportion, and that the animator must adjust his previous experience. How? One way, for example, is to be wary of extreme close-ups. The effect of wide-screen, for the audience, is greater visual impact. The staff can produce jarring effects in closeups.

"The illusion of dimension is super-wide-screen is similar to sitting and viewing a normal movie in one of the first three rows of a theater," said Saul Bass. "If under these conditions, you have extreme closeups or across-the-screen action, the audience must visually "tuck" it because peripheral vision cannot encompass the screen under these conditions."

In a sense, the job of composing for wide-screen is comparable to an actor working in a small theater, and then switching to a grand music hall. In both cases, the artist's timing must adjust to the change.

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lens length of the lens used becomes more critical. Also, being able to get in close enough for proper focusing becomes a problem.

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90-foot wide curved screen. The Panavision lens, insured for \$18,000, has a fixed focus range from 19 inches to 10 inches.

The wider field of the Cinemascope also presented a problem in distributing light evenly over a larger working area on the animation stand. Previously, two 500-watt baby leg lights simply provided even light distribution. However, when filming the larger cels, the results suffered from uneven light distribution. Playhouse Pictures' head cameraman Allen Childs solved this problem by building a special glass platform to accommodate the wider cels and by adjusting the lighting to cover the greater area.

All cinematography was done with 65mm Eastman Color Negative film. Solid color backgrounds were created on pieces of cardboard. The black-and-white texture cels then were placed over these "color cards" and filmed.

Because this wide-screen animated color tale was a "first," film editor Hugh Kelley, chose to work with a 35mm reduction print. Obviously, it was also more economical to work with the smaller print.

Producing this animated color tale for the Cinemascope ultra-wide-screen proved to all concerned that there are few problems in film production today that cannot be solved by ingenuity, imagination and cooperative effort. *

SHOOTING FROM THE AIR

Continued from Page 708

Utmost cooperation between pilot and cameraman at all times is, of course, highly essential. The pilot will do some briefing of his own, such as demonstrating use of the safety belt and assisting the cameraman and any others accompanying him on the flight getting into the parachute harness, if one is to be worn. (Regulations usually make it mandatory).

A means of communication between pilot and cameraman during flight is a must. Most camera planes are equipped with two-way intercom phones. When such is not available, then a series of simple hand signals should be established, practiced and memorized prior to taking off.

When shooting is to be done from a high plane or helicopter, the cameraman's shooting position is seldom left to chance. When a larger plane is to

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be used, the ideal shooting location is in the nose of the craft, or well toward the tail structure. The ideal situation, of course, is to shoot from a specially constructed camera plane, such as those which Paul Menz provides Hollywood film producers for shooting aerial scenes, and which have provision for mounting the camera in several locations within the plane, including the tail, and afford large window areas appropriately glazed with technically correct glass for ideal photographic.

Camera Angles

Unless necessary to the story, no aerial shots should be made of close range objects, shooting directly at right angles; this only produces "choppy" results because the target is passed more rapidly and the shooting time is consequently shorter. Best results in shots of this type are achieved when the camera is aimed at an angle—a little forward or to the rear. The subject will remain in the lens field of view longer and any lurching or vibration of the plane will be less apparent when the footage is screened, due to the greater camera-to-subject distance.



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Steady support of the camera is an important factor in successful aerial photography. When shooting with a 16mm camera hand-held, avoid supporting it on a window ledge or holding against the plane structure. Brace your legs and keep elbows close to your body. Avoid any contact with the plane, except for the seat and/or floor.

When using a camera that is too large to hold by hand, it may be mounted on a tripod or some improvised support. Where available, a shock-absorbent rubber section should be mounted between the camera base and the tripod head to absorb vibration of the plane. The familiar hi-hat camera mount is often used for supporting a heavy camera when shooting from a plane. The hi-hat may be bolted securely to the plane structure, or to a strake secured to the structure. Any tripod or other mount used in aerial photography should be locked or otherwise "tied down" as a safety measure, both for the cameraman and the equipment.

All these factors—position of the camera in the plane, the filming angle, and the method of supporting the camera—play an important part in obtaining footage with steady images. However, there are still other factors yet to be considered. First there is the degree of variable shutter opening in relation to percentage of frame-overlap of the terrain being photographed. Contrary to popular belief, a narrow shutter opening will not neutralize the effect of any plane vibration transmitted to the camera. While each frame image of the film may be slightly sharper, as a result of using the narrow shutter opening, there may be undesirable flicker on the screen when the film is projected. So, it is better to make some sacrifice in image sharpness than to have too great an interval of terrain movement between frames. It has been found advisable to never work with the shutter closed down beyond the 100 degree point in aerial photography.

Increasing Camera Speed

Increasing the frames-per-second speed of the camera will compensate somewhat for the speed of the plane, and therefore in reducing the interval between exposed frames of aerial footage made of terrain in air-to-ground photography. Additionally, this gives a shorter exposure time (increased shutter speed). This more than com-

pensates for the slightly more prolonged exposure obtained where a larger shutter opening is used, and also results in a degree of slow motion effect which tends to minimize the visual effect of vibrations.

When photographing from aircraft, the fpe speed of the camera should always be higher than normal. This reduces the interval between each exposure (frame of film), gives a shorter exposure time, and tends to smooth out any undesirable camera movement on the screen. Depending upon the speed and altitude of the plane, in air-to-ground photography, a shooting speed of 32 to 64 frames per second should be used to obtain normal effects in the projection of the picture at 24 fpe. As increasing altitude takes you farther from the subject, camera speed may be reduced without inducing flicker on the screen.

When shooting as to be done from slow-moving aircraft, such as a helicopter or blimp, the normal camera speed of 24 fpe will produce acceptable results, even for low altitudes.

Next month we will discuss lenses and filters for aerial photography. *

Don Higgins, "Shooting Movies From The Air," American Cinematographer, Vol. 30, No. 9

BEHIND THE CAMERAS

Continued from Page 799

RAY REINARSEN, ASC, "Channing".

NICK MICHIGIA, ASC, "Jack Benny Show".

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LEWIS COLEMAN, ASC, "Three Crazy Cat-Jerks" (T-Color) with Bruce Keith and Vera Miles, Norman Tokar, director.

PAUL REIDING, "The Moon-Spinners" (T-Color), shooting in Cairo & London) with Haley Mills and Elia Walilch James Neilson, director.

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WILLIAM DANIELA, ASC, "Riders and the 7 Hoods" (P-C Prod.) (T-Color and P-Color) with Frank Sinatra and Dean Martin. George Douglas, director.

CHARLES LANE, ASC, "Ben and the Single Girl" with Tony Curtis and Natalie Wood. Richard Quine, director.

RALPH WOODLEY, ASC, ROBERT HOFFMAN, "Tompe Homen".

HARRY SCHERLING, ASC, "My Fair Lady" (Super P-Color, 30-T-Color) with Audrey Hepburn and Rex Harrison. George Cukor, director.

DON GLENDON, "Secret Strip".

WILLIAM GLENDON, "Carpenter Antenna" (WB-Prodigious Prod.) with Fred MacMurray and Polly Bergen. Curtis Bernhardt, producer-director.

ROBERT HARLAN, ASC, "The Out Of Towners" (Merian Maunsell Prod.) with Glenn Ford and Geraldine Page. Delbert Mann, director.

LO HINTON, should list name as above.

DON GLENDON, "77 Sunset Strip".

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DON MAZARAND, ASC, an cinematographer, compares the new Mitchell Mark IV Super camera (right) with the 1970 model of the Molegraph camera built by Henry Mole and Herman Custer and used by Don Mazarand Film Company in New York in photographing many famous celebrity silent pictures. Mazarand is member of local 644, IATSE. New York, is an internationally-known collector of historic motion picture cameras and equipment. (Photo by George J. Mitchell)

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